

REMARKS

Reconsideration is respectfully requested.

I. Status of the Claims

Claims 1, 5 – 7, 9 and 12 - 14 are presently pending, with claims 2 – 4, 8, 10 and 11 having previously been canceled without prejudice or disclaimer. Applicants amend claims 1, 5, 9 and 12, and add new claims 15 - 18. No new matter is added. Support for the amendments may be found, for example, with reference to Applicants' specification at page 20, line 16 through page 27, line 21; page 29, line 9 through page 31, line 7; page 39, line 7 through page 41, line 2; and with reference to Applicants' Table 1 and FIGs. 3, 5, 11 and 12.

II. Rejections under 35 U.S.C. §§ 102, 103

Claims 1, 5, 6, 9, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,372,348 to Hanejko et al. (“Hanejko”)¹ in view of U.S. Patent No. 6,162,836 to Kato (“Kato”). Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanejko in view of Kato and U.S. Patent No. 5,306,524 to Rutz et al. (“Rutz”). Applicants amend claims 1, 5, 9 and 12 to further clarify the nature of their invention, and respectfully traverse the rejections of claims 1, 5 – 7, 9 and 12 - 14 under 35 U.S.C. § 103(a).

In amended independent claim 1, Applicants claim:

1. A soft magnetic material used to make powder magnetic cores comprising:

¹ Although the Examiner attributes this reference to Rutz, we believe according to the cited patent number that he intended to make reference to Hanejko et al.

a plurality of composite magnetic particles formed from a metal magnetic particle and an insulative coating surrounding a surface of said metal magnetic particle and containing metallic salt phosphate,

a lubricant formed as fine particles added at a proportion of at least 0.001 percent by mass and no more than 0.005 percent by mass relative to said plurality of composite magnetic particles, wherein:

said lubricant formed as fine particles has a mean particle diameter of no more than 2.0 microns.

(Emphasis added).

Hanejko discloses annealable insulated metal-based powder particles that may for example be formed with iron or nickel-based core particles that are provided with two different insulating layers (see, e.g., Col. 6: 5 – 70 and Col. 7:55 – Col. 8: 24 of Hanejko). The first of the two layers is a “pre-insulating” layer, which may be formed from an iron phosphate salt. The second layer includes oxide particles in an insulative coating and has a weight of between 0.001 percent and 15 percent of the weight of the metal core particles (see, e.g., Col. 5: 50 – 55 of Hanejko). Hanejko further teaches that a lubricant such as zinc stearate can be added to the powder composition “in an amount up to about 1 percent by weight” (see, e.g., Col. 10: 56 – 62 of Hanejko). The Examiner acknowledges that Hanejko is silent as to the particle size of the lubricant used, but suggests that the addition of Kato overcomes this deficiency. Kato discloses a process for preparing an aqueous dispersion of a higher fatty acid zinc salt that is suitable for use as a lubricant (see, e.g., abstract and Col. 3: 54 – 60 of Kato). Kato discloses six of eight examples of the dispersion in which an average particle size of the zinc stearate was between 1.0 and 2.0 microns.

While Hanejko teaches that lubricants can be added to an iron powder composition “in an amount up to about 1 percent by weight,” Applicants submit that none of the cited references teach

or suggest that the lubricant must be held to a proportion of at least 0.001 percent by mass and no more than 0.01 percent by mass relative to said plurality of composite magnetic particles in order to obtain the reduction in iron loss achieved by Applicants' claimed invention (i.e., iron loss less than 200 W/kg as shown for example in Applicants' Table 1). Applicants submit that this reduced level in iron loss represents "new and unexpected results relative to the prior art." *See, e.g., Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1322, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004).

As described in Applicants' specification, for example, at page 30, line 9 through page 31, line 7, Applicants posit the following theories to explain the results achieved in this range:

If the amount of the zinc stearate used as lubricating powder added is too small, the advantage provided by the addition of the zinc stearate will be inadequate, leading to the destruction of the phosphate coating serving as the insulative coating 20 during compacting. Also, flowability between particles is reduced, leading to increased distortion being introduced into the iron particles during compacting. It is believed that eddy current loss and hysteresis loss increase for these reasons, leading to increased iron loss. If the amount of zinc stearate added is too high, there is an increased amount of the non-magnetic layer between iron particles. This is believed to generate demagnetizing fields between iron particles, leading to increased iron loss.

Also, if the particle size of the zinc stearate is small, the zinc stearate can be distributed uniformly and thinly on the surface of the iron particles, maximizing the lubrication effect. If the particle size of the zinc stearate is large, the probability of its presence between iron particles is less even if the amount added is the same. Thus, the lubrication effect obtained during compacting is reduced. Thus, in this example, powder magnetic core iron loss appears to be reduced when the mean particle diameter zinc stearate is no more than 2.0 microns.

The Examiner suggests that evidence of the non-obviousness of the claimed mass-percentage range of lubricants claimed "should include evidence and/or a declaration commensurate with the claimed subject matter." In response to this suggestion, Applicants submit a Declaration

under 37 C.F.R. § 1.132 made by one of the inventors, Dr. Toru Maeda. In this Declaration, Dr. Maeda describes the development of the present invention by himself and his co-inventors, including their discovery after significant experimentation as to the critical range of amounts of lubricant that may be added to the material in order to achieve low iron loss. In his Declaration, Dr. Maeda references the above-presented theories developed by inventors in order to explain the surprising results.

In Dr. Maeda's opinion, in view of the cited references, one skilled in the art at the time of their invention would not have readily understood or suspected their discovery as to the relationship between the weight proportion lubricant added to the soft magnetic material of independent claim 1 and iron loss. Further, it is Dr. Maeda's opinion that one skilled in the art at this time would not have readily derived their discovery as the result of routine experimentation. Therefore, and for at least this reason, Applicants respectfully submit that independent claims 1 is not obvious in view of the cited references and stands in condition for allowance.

As amended independent claim 9 claims essentially amounts of lubricant as claimed in allowable independent claim 1, Applicants submit that amended independent claim 9 is also allowable for at least the same above-argued reasons. As claims 2, 5 – 7 and 11 – 14 each depend either directly or indirectly from one of allowable independent claims 1 and 9, Applicants submit that dependent claims 2, 5 – 7 and 11 – 14 are also allowable for at least this reason.

Therefore, Applicants respectfully request that the rejections of claims 1, 5 – 7, 9 and 12 - 14 under 35 U.S.C. § 103(a) be withdrawn.

III. New Claims

Applicants add new claims 15 - 18. As new claims 15 – 18 each depend from one of allowable independent claims 1 and 9, Applicants respectfully submit that new claims 15 - 18 are also allowable for at least this reason.

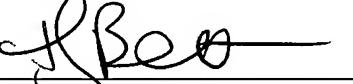
CONCLUSION

In view of the above amendments and remarks, Applicants believes the pending application is in condition for allowance. If there are any remaining issues which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

The Commissioner is authorized to charge any deficiency or credit any excess in this fee to Deposit Account No. 04-0100.

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Respectfully submitted,

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